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TWO NEW CRETACEOUS FRESH-WATER GASTROPODS FROM MONGOLIA[1]

BY CHI PING[2]

PREFATORY NOTE

The shells here described were submitted to me by Mr. Walter Granger who collected them in the Dohoin Usu Cretaceous beds of Mongolia.[3] I have asked Dr. C. Ping, the Director of the Fan Memorial Institute of Biology in Peking, and of the Biological Laboratory of the Science Society of China in Nanking, to prepare the descriptions and illustrations. Dr. Ping is a member of the Palæontological Staff of the Geological Survey of China, as well as a highly trained zoologist. He has undertaken the study of the fossil terrestrial and fresh-water gastropods of China. The illustrated types are deposited in the Museum of the Geological Survey in Peking, in accordance with agreement. Others (paratypes) are deposited in The American Museum of Natural History.

A. W. GRABAU.
Geological Survey of China, Peking,
May, 1930.

The two gastropods of which the following descriptions are given were collected in Mongolia by Mr. Walter Granger of the Central Asiatic Expedition in 1925. Their chief features fit into the genus *Vivipara* of the family Viviparidæ, but they do not agree with any species, either fossil or living, on record. It is deemed necessary to consider them as new species.

Vivipara grangeri, new species

Text-Figs. 1–2, holotype; 3–4, mut. α; 5–9, mut. β; 10, mut. θ.

Shell of moderate size, ovoid, moderate-spired, whorls 6. Apex, in most specimens not preserved, but in some, slightly obtuse. First whorl small, low, rounded, embraced by the next up to the ambitus. Second whorl longer, with its surface slightly convex. Third and fourth whorls with surfaces more convex. Fifth still more convex than the fourth. The increase in size and degree of convexity of the surface regular and gradual from second to fifth whorl inclusive. Body whorl with sudden increase in size and convexity, its length slightly shorter than that of the spire. From the first to the fifth whorls inclusive, each following whorl is about one and one-half times the preceding one. Suture between each two successive whorls very pro-

[1]Publications of the Central Asiatic Expeditions of The American Museum of Natural History. Contribution No. 103.

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[3]Berkey, Charles P., Granger, Walter, and Morris, Frederick K. November 8, 1929. "Additional New Formations in the Later Sediments of Mongolia." American Museum Novitates, No. 385.

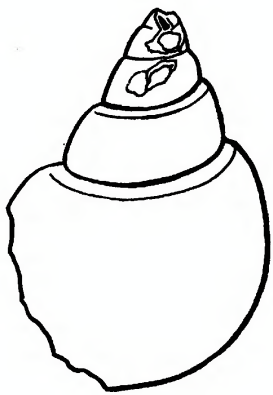

Fig. 1

Fig. 2

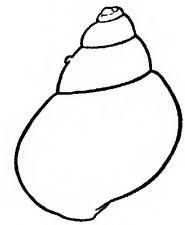

Fig. 3

Fig. 4

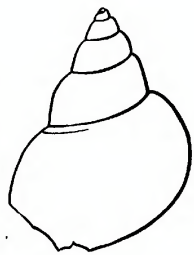

Fig. 5

Fig. 6

Fig. 7

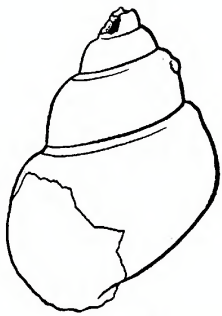

Fig. 8

Fig. 9

Fig. 10

Figs. 1, 2. *Vivipara grangeri*, new species. Enlarged ×2. Holotype. Catalogue G. S. C. 3000.

Fig. 3. *Vivipara grangeri*. Mutation α. Enlarged ×2. Catalogue G. S. C. 3001.
Fig. 4. *Vivipara grangeri*. Mutation α. Enlarged ×2. Catalogue G. S. C. 3002.
Fig. 5. *Vivipara grangeri*. Mutation β. Enlarged ×2. Catalogue G. S. C. 3003.
Fig. 6. *Vivipara grangeri*. Mutation β. Enlarged ×2. Catalogue G. S. C. 3004.
Fig. 7. *Vivipara grangeri*. Mutation β. Enlarged ×2. Catalogue G. S. C. 3005.
Fig. 8. *Vivipara grangeri*. Mutation β. Enlarged ×2. Catalogue G. S. C. 3006.
Fig. 9. *Vivipara grangeri*. Mutation β. Enlarged ×2. Catalogue G. S. C. 3007.
Fig. 10. *Vivipara grangeri*. Mutation θ. Enlarged ×2. Catalogue G. S. C. 3008.

nounced, particularly in the case of the last three whorls; the fifth and sixth (body) whorls, each with its uppermost margin along the suture, somewhat flattened or even depressed, forming an incipient sutural shelf with, more rarely, a slight canaliculation. All the whorls without angulations or edges on surface. Fine striæ are recognizable on the fourth whorl, and are particularly distinct on the surfaces of the last two. They are somewhat oblique and curved. Umbilicus small and shallow. Inner lip thin, its lower portion somewhat overshadowing the umbilicus. Aperture oval, large.

Length, excluding apex and part of first whorl, 25 mm.; width of body whorl 18 mm.

Apical angle not determinable; side angle, 49.2°.

A number of individuals of this species were collected and found associated with a duck-billed dinosaur. Many of the specimens are covered with sandy clay, and a few had adhering minute pieces of iron oxide. Most of them have the apex and part of the first whorl broken off.

Fig. 11

Fig. 12

Figs. 11, 12. *Vivipara fusistoma*, new species. Enlarged ×2. Holotype. Catalogue G. S. C. 3009.

In the series of specimens, many variations and changes in growth could be observed. The younger shell, whose length measures 14–16.5 mm. and body whorl 9–12 mm. wide, has the sutural shelf not yet developed. The surfaces of all the whorls of the spire are moderately convex without any tendency to be flattened or depressed along the suture. The body whorl shows a gentle sloping from the suture in spite of its considerably more convex surface. The suture between the body whorl and the last whorl of the spire is almost the same as, or only slightly deeper than, the one between each two whorls of the spire. The shell at this stage of growth (Figs. 3 and 4) is designated as mutation α (in Waagenian sense). Coming to an older stage we can recognize at once the gradual development of the sutural shelf. The suture between the body whorl and the preceding one becomes more pronounced, owing to the slight raising of the region along the uppermost margin of the body whorl. In the region near the aperture, the sutural shelf begins to appear, but it is not conspicuous (Figs. 5 and 6). The larger shells have this sutural shelf clearly marked out along the uppermost margin of the body, and the sutures bounding the uppermost margin of the last whorls of the spire are decidedly pronounced (Figs. 7, 8 and 9). The sizes of the shells run from 15 mm. to 22 mm. long and from 12.5 mm. to 14.5 mm. wide in body whorl. The shell at this stage is designated mutation β. Finally, the

development of the sutural shelf could be seen not only along the uppermost margin of the body whorl but also along that of the last whorl of the spire, and the tendency to grow such a characteristic structure is even traceable in the preceding whorl on the spire in the case of a still larger shell (Fig. 10) which measures about 25 mm. long and about 18 mm. wide in its body whorl. This is designated as mutation θ. These stages are quite traceable in the large number of specimens in the present collection and are shown particularly in these few whorls, whose sutures and whorl surfaces are not obscured with sandy clay.

HORIZON AND LOCALITY.—From the gray sandy clay layer of the Dohoin Usu formation (Cretaceous), 55 miles east and 60 miles north of Shabarakh Usu, Outer Mongolia. Collected by Mr. Walter Granger, Central Asiatic Expedition, 1925.

HOLOTYPE.— Museum of the Geological Survey of China, Catalogue No. 3000.

Specimens of mutations figured (Figs. 3–10). Museum of The Geological Survey of China, Catalogue Nos. 3001, 3002 (Figs. 3, 4, mut. α); 3003–3007 (Figs. 5–9, mut. β); 3008 (Fig. 10, mut. θ).

Vivipara fusistoma, new species

Text-Figs. 11, 12

Shell of comparatively small size, fusi-ovoid, moderate-spired. Whorls 5. Apex not preserved in the type specimen. First whorl slightly shorter than second. Second whorl only one-half the third in length. First two whorls slightly convex. Third whorl very convex, more so than fourth. Fourth whorl not exceeding, or practically equal to, third in length. Surface of fourth whorl convex only to a moderate degree. Body whorl much larger, its length greater than that of the spire, but not so expanded laterally as in the case of the preceding species; its surface very convex. Suture between whorls distinct, perhaps shallow between the first two whorls. Aperture fusiform in outline. Peristome seeming to be reflected, both outer and inner lips appearing to be comparatively thick. Umbilicus not clearly shown in the preservation.

This specimen was covered all over with hardened sandy clay. After it had been cleaned, it was not possible to make out the striæ on the surfaces of the whorls, but it appears to have very fine striæ on the last two whorls. The body whorl has a moderate blunt shoulder in its last half portion. Only one specimen of this species is found in the collection.

Length, excluding apex, 17.3 mm.; width of body whorl, 10.7 mm.

Apical angle not determinable; side angle, 37°.

HORIZON AND LOCALITY.—Same as the preceding species. Collected by Mr. Walter Granger.

TYPE.—Museum of The Geological Survey of China, Catalogue No. 3009.